COMPUTER SCIENCE

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Why is the study of Computer Science important?

Computer Science is the study of the principles and use of computers. Its study will make you question how the systems that you use in a modern day society work and encourage you to explore the concepts behind the technology you use and develop skills to become a creator of technology yourself. From Year 7 you will have the exciting opportunity to develop and consolidate basic ICT skills that will allow you to access more complex Computer Science concepts. From there you will study the four cornerstones of computational thinking, these are crucial as they can be applied to any computer science context and will provide firm foundations for other topics within the subject. From this, key programming constructs can be learnt, allowing you to develop programming skills in more than one environment, this will help you to understand key similarities between different programming environments and develop key skills in problem solving and debugging. These skills will be further consolidated and mastered in text based programming languages throughout your study, applying the cornerstones of computational thinking in a wealth of scenarios to develop your problem solving skills. Computer Science theory is also explored, looking 'under the bonnet' of the computer systems that you use on a day-to-day basis. Key systems hardware are investigated, including how networks are formed, the inherent security risks that networked devices produce and how to mitigate against these risks. Computer security is currently one of the biggest risks to national security, is relevant, interesting, and provides you with knowledge that can help you become a responsible e-citizen. Your study of Computer Science will encourage you to think deeply and help you more effectively to become a resilient problem solver that understands the technological world in which we live – a great life skill that all universities and employers will appreciate.

Across your study you will explore fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation. You will analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs. Furthermore, the subject will teach you to think creatively, innovatively, analytically, logically and critically and understand the impacts of digital technology to the individual and to wider society. Lessons will provide a wide range of opportunities for practical application of key concepts through a chosen programming language as well as plentiful opportunities for you to investigate how computers work. In addition, there will be opportunities for extended discussion about the ethical, moral and social implications of technology in society.

Big Questions will be explored such as are the developments in artificial intelligence affecting job prospects and opportunity? Is technology creating a digital divide that further disadvantages people in developing countries? Can you create a program for a specific scenario to solve a problem? What opportunities and issues does the internet develop? All of these questions are key and can be explored by understanding key computer science concepts both through theory and practical application.

Within all aspects of the modern world, digital literacy has become paramount in any workplace or educational setting in the world. A good understanding of how to use technology to perform common tasks is a requirement that students need to be prepared for. Students will learn how technology can be used and apply this to real-world settings, investigating modern-day problems spanning the bridge between humanities and technology. This includes hands-on life-skills to prepare students for post academy life.

What skills will the study of Computer Science teach you?

You are a citizen in this world and you need to know how to solve problems using technology and the key concepts involved in the technology that we have become so dependent on. It will teach you to…

- Apply computational thinking techniques (abstraction, decomposition, pattern recognition, algorithms) in a range of scenarios to solve problems.
- Develop resilience by not being afraid of challenges when solving problems, but to break them down and keep trying.
- Be creative in a subject that may not be renowned for it – there is no limit to creativity when you create the solution.
- How to act responsibly online to ensure that you and others stay safe online.
- Identify the key programming constructs (sequence, selection, iteration) required to solve a problem.
- Apply the key programming constructs (sequence, selection, iteration) to any programming language.
- Work independently and part of a team to solve complex problems.
- Construct reasoned arguments to ethical, social and moral problems that have arisen due to technology and communicate these in an effective way.
- Identify links between different elements of computer science
- Evaluate different methods of representing data and decide on the most suitable method for presentation/storage

Real-life scenario based work will be at the core of all of the units of study, for example students will learn:

- how to prepare documentation
- how spreadsheet software can be used to plan trips, calculate expenses and salaries
- how to present ideas clearly and articulation of opinions
- how to use maps to display information and effectively researching

How does your study of Computer Science support your study in other subjects?

Study of any subject in our curriculum takes full advantage of links with other subject areas - we term these as interdisciplinary links and we make the most of them because we know that deep learning requires the transference of knowledge and skills from one topic of learning to another. Once you can transfer your learning across topics and subject areas then you are really mastering what you know and how to apply your understanding and skills.

Computer Science touches on so many other subjects such as mathematics as you develop skills in problem solving, including decomposition (breaking down problems), abstraction (removing unnecessary detail from a problem) and pattern recognition. All of these skills will support your teaching in Mathematics as these are very important in being able to solve mathematics problems in a range of contexts. There are also links with Science as binary logic can be applied to electrical circuits in Physics and much of the technology from Computer Science can be mapped back to core principles of Science. For example, how sensors are used to monitor motion, force and/or pressure. You will learn methods of thinking and research that are widely applicable to other subject areas helping your thinking in all subjects.

How can you deepen your understanding of Computer Science?

The Computer Science department offers lots of great opportunities for you to really engage with this fabulous subject. In Year 7 & 8 we engage with an external program called iDEA (Inspiring Digital Enterprise Award). This is an online program that students can complete in addition to their lessons to develop digital and enterprise skills. It is an initiative from the Duke of York and is the digital equivalent of the Duke of Edinburgh programme. Why not continue the iDEA programme at home to complete your bronze award, see if you can complete all the badges, develop your digital literacy and enterprise skills and compete against other students in the trust.

How does your study of Computer Science support your study in other subjects?

Digital literacy is designed to support your study of other subjects. It provides you skills in a range of areas, including analytical - giving you the ability to analyse data from any subject to form opinions. The curriculum supports your development in English, with examples such as letter writing and using technology to communicate.

Technology is all around us, and taking an interest in the products that you may see on social media such as videos, graphics etc not just for their content but also the underlying design principles around them. Why is a video constructed in the way it is? Why do magazines design and layout their front cover in the way they do? These questions will further deepen your understanding within the subject. Immersing yourself in digital media will certainly help deepen your knowledge and understanding of media products.

How are you assessed in Computer Science?

Throughout the Computer Science course you are assessed using the following assessment objectives which ensure that you can cumulatively build your subject understanding in preparation for future GCSE and A Level study. For younger years we base our assessment on our subject mapping of the age related expectations

across the curriculum, assessing students' performance at their current stage of study against expectation. At GCSE we make informed predictions informed by our holistic assessment of their progress against the key assessment objectives and their aspirational GCSE targets. These are also the basis for any appropriate support and intervention.

Key Assessment Objectives

AO1: Demonstrate knowledge and understanding of the key concepts and principles of Computer Science.

A02: Apply knowledge and understanding of key concepts and principles of Computer Science.

A03: Analyse problems in computational terms:

- to make reasoned judgements
- to design, program, evaluate and refine solutions.

	GCSE COMPUTER SCIENCE PROGRESSION PATHWAY AT OUTWOOD ACADEMY ACKLAM					
	Half Term 1	**Half Term 2**	**Half Term 3**	**Half Term 4**	**Half Term 5**	**Half Term 6**
Year 10	Representing data in computer systems	Algorithms and problem solving	Programming fundamentals	Producing robust solutions	Systems architecture	Memory and Storage
Year 11	Networks - LANs, WANs and Network Topologies	Networks - Network Hardware, Packet Switching and the Internet.	System Security	Ethical, legal, cultural and environmental impacts of digital technology	Knowledge retention and recall	Exam paper 1 and 2

KS3 COMPUTER SCIENCE PROGRESSION PATHWAY AT OUTWOOD ACADEMY ACKLAM

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 7	E-Safety	Computational Thinking	Music Festival - Spreadsheet modelling	Music Festival - Word Processing & Presentation Software	Programming - BBC Micro Bits	Technology That Has Changed Our Lives
Year 8	E-Safety Outwood Travels	Outwood Travels	Data Representation - Numbers	Data Representation - Images & Sound	Python Programming	IDEA - The Inspiring Digital Enterprise Award
Year 9	Esafety Python Programming	School Production	Computer Systems	Spreadsheet Software	Data Representation	Impact of Technology